State of Tennessee
Department of General Services
Wildfire Fighting Bulldozer Specifications

INTRODUCTION: The specially equipped firefighting bulldozer offered shall meet the detailed requirements listed below (unless otherwise noted).

Bulldozers covered by this specification are a highly specialized firefighting type. The intended use is to construct fire lines in varying conditions of terrain and forest types in Tennessee and elsewhere while providing the latest products available for operator safety. The bulldozers are required to push and/or pull a sustained load for 12 - 16 hours without stopping, while engaged in critical fire line construction activities. The engine, transmission, and other drive train components shall withstand the constant strain required to construct fire lines by blading and/or plowing for extended periods without overheating or loss of power. Parts and service shall be readily available throughout the state of Tennessee. The unit shall be new, unused and be prepared for service when delivered to the specified location.

1). **General**

a) This specification covers diesel engine-powered, bulldozers and attachments. The bulldozer shall be OEM with attachments meeting requirements listed here, The tractor offered shall be a current, in-production model.

(b) Use Conditions. Bulldozers covered by this specification are a highly specialized firefighting type. The intended use is to construct fire lines in varying conditions of terrain and forest types in Tennessee and elsewhere while providing the latest products available for operator safety. The bulldozers are required to push and/or pull a sustained load for 12 - 16 hours without stopping, while engaged in critical fire line construction activities. The engine, transmission, and other drive train components shall withstand the constant strain required to construct fire lines by blading and/or plowing for extended periods without overheating or loss of power. Parts and service shall be readily available throughout the state of Tennessee. The unit shall be new, unused and be prepared for service when delivered to the specified location.

Components of the electrical, fuel, and exhaust systems shall be designed to resist any harmful effects of dust or water. The bulldozers shall not be susceptible to immediate loss of power during the occurrence of "belly-pan fires." Hydrostatic machines shall have any hoses which connect the machine's hydrostatic pump to the hydrostatic drive motors for the track system routed, constructed, and/or adequately protected so as to maintain their integrity and operability during such fires, sufficient to allow the operator time to remove the machine from the area.

(c) Ground Clearance

The Contractor shall provide a smooth uncluttered under carriage and adequate ground clearance for the bulldozers. Ground clearance shall be measured when the machine is parked on level surface from the lowest point beneath the machine vertically to the bottom of a track shoe. The height of the grouser shall not be included in this measurement. Ground clearance for the machine shall be a minimum of 13 inches. Bulldozers that have been modified to meet ground clearance requirements are not acceptable. No openings are allowed under the bulldozer that may be snagged.

(d) Ease of Maintenance
The design of the tractors and accessory installations shall permit readily accessibility for servicing, replacement, and adjustment of component parts and accessories with minimum disturbance.

(e) Frame
The frame shall be designed to withstand maximum stresses under normal operating conditions and in addition, provide adequate support for attaching any device approved by the tractor manufacturer for use in combination with the tractor.

(f) Tractor Operating Weight
The tractor operating weight shall represent the tractors exact weight as offered herein, this in a full serviced condition with full fuel, water, oils, and lubricants. The operating weight shall be between 18,000 and 27,600lbs.

(g) Occupational Safety and Health Act
The tractor shall be furnished with all applicable equipment and accessories as required by the Occupational Safety and Health Act (OSHA) and Tennessee Code Annotated (TCA).

2). **Engine**

(a) The engine shall be a current production bulldozer engine offered by the manufacturer at the horse power bid. Prototype engines are not acceptable.
(b) The engine shall be turbocharged diesel USA EPA Tier IV Final Certified operating on Ultra Low Sulfur Diesel Fuel.
(c) A pre-screener air intake shall be placed internally or externally on the hood and protected by a perforated guard. The maximum height shall be 10" above hood.
(d) The primary engine air filter element shall be fire resistant.
(e) The fuel system may be manually primed.
(f) The engine block coolant heater, 110 volt and shall be easily accessible without tools. Ether will not be accepted.
(g) A manual engine fuel shutoff system with control inside the operator cab shall be required.
(h) The engine shall be equipped with a heavy duty fuel and oil filter system, including a fuel/water separator.
(i) Air cleaner hose shall be metal or heavy duty flexible, non-collapsible type, (wire reinforced hose shall not be acceptable) with metal or molded rubber elbows. Only stainless steel clamps are to be used. A venturi effect exhaust pipe from the engine shall be weather resistant and not require modification after delivery to prevent precipitation from getting to the engine. An exhaust cover flap shall not be acceptable.
(j) The exhaust stack outlet is to extend upward above the hood and be constructed of rigid steel pipe or tubing and should not protrude above the cab or limb risers.
(k) The exhaust pipe shall not allow water to enter when engine is not running.
(l/m)
Under Federally allowed exclusions from emissions regulations for fire equipment, manufacturer shall include an in-cab mounted, bypass switch that allows the operator to temporarily delay any emissions related derate or change in performance while equipment is

operating in an active fire. It is understood that this function is not related to DEF fluid and that DEF fluid is required for the equipment to operate**.**

(n) The fault indicators shall alert the operator to known issues. The bulldozer(s) shall not de-rate due to lack of DEF, overheating or other emissions related issues.

(o) The emissions system shall automatically clean deposits and not require operator input or operations changes.

(p)Emission systems that require stopping the machine to allow for after treatment cleaning shall not be accepted.

3). **Engine Cooling**

(a) The Machine shall have the ability to perform "drawbar" work over long distances, such as pulling a fire plow (heavy disc harrow) or bulldozing fire lines during the hottest days of the year up to 110 degrees F ambient temperature without overheating.

(b) The unit shall have the most severe duty radiator offered by the manufacturer.

(c) The radiator shall be heavy-duty, forestry type, designed with maximum resistance to plugging.

(d) The cooling fan shall discharge air in a direction away from the operator.

(e) The radiator grille shall be designed for heavy-duty forestry service, louvered or perforated, quick release, with four to seven vertical structural members.

(f) The extreme service radiator guard shall be hinged with quick release. The radiator guard shall be built with the thickest gauge material offered by the manufacturer.

(g) The radiator guard shall have horizontal louvers that shall prevent major damage to radiator by tree limbs or brush.

(h) Vertical supports welded to the external part of all louvers or perforated type guard is preferred. If louvered type, all louvers shall be welded adequate for the intended application to all points of contact of vertical supports.

(i) Coolant hoses shall be covered / protected with fire sleeving, Aeroquip AE 102 or equivalent. The cooling system shall be protected to a minimum of minus 20 degrees F.

4). **Fuel Lines and Fuel Tank**

The manufacturer's standard (minimum 8 hours operating at maximum RPM) fuel tank(s) shall be acceptable and located so as not to be affected by heat from the engine exhaust pipe or muffler.

(a) Fuel tank shall be made of stainless steel, or carbon steel and coated with a rust inhibitor, and the entire fuel system shall be guaranteed to function without rust effects for a minimum of 15 years. Plastic/poly tanks are not acceptable. Fuel lines shall be stainless steel braided hose rated for fire resistance of Aeroquip AE102.

(b) Entire fuel system shall be rust free for the life of the machine from fill cap to engine.

(c) Fuel filter housing shall be metal or shielded/protected to withstand excessive heat.

(d) Fuel tank drain shall be easily accessible.

5). **Powertrain**

(a) The powertrain shall be dual path, hydrostatic drive with single lever joystick control. Travel speed control shall be in grip and independent of direction control motion.

(b) Transmission system shall provide load-sensing, power turns, counter-rotation, and anti-stall.

(c) Transmission, decelerator and steering system shall provide precise inching control.

(d) The hydrostatic drive system will have a separate sump from the main hydraulics or a sump that will provide a reserve so that the hydrostatic drive will continue to function in the event of

a main hydraulic system failure or a sensor will be in the tank that will alert the operator of a hydraulic fluid loss so that the dozer can be moved to a safe area.

6). **Electrical System**

(a) 12 or 24-volt electrical system shall be supplied with dual batteries (two, 12-volt batteries wired to industry appropriate standards).
(b) The alternator shall be rated at 100 amps minimum.
(c) Batteries shall be equipped with master electrical disconnect switch.
(d) The external lighting system shall consist of four adjustable overhead mounted LED or combination work lights on the front (Two forward facing lights in the center of the ROPS and two outer lights angled outward) and two rear mounted, rear facing LED work lights.
(e) Exterior lights shall be mounted in a protected location and have shielding from tree limbs and brush that does not obscure the beam.
(f) Each pair of lights shall be an independently switched circuit. A self-resetting circuit breaker shall protect each independent circuit.
(g) A 12-volt access port shall be provided with a minimum capacity of 10 amps.
(h) A 12-volt 30 amp power supply capable of powering a 100 watt 2 way radio shall be provided.

7). **Operator Environment**

(a)The operator's station shall be a fully enclosed, sound suppressed, ROPS cab. It shall be heated, air conditioned and pressurized.
(b)The Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) shall meet the requirements of the latest issues OSHA 1910.266 and SAE J1040, J1084 and J231, and be fully certified.
(c) No standard interior equipment shall create a hazard to the operator during a rollover when properly using seatbelt or harness.
(d) An interior dome light shall be included in the operator's compartment.
(e) The operator's seat shall be a deluxe, full suspension seat.
(f) The operator shall have a four point safety harness, minimum 3 inch width, with quick release. The harness shall meet the appropriate SAE safety requirements.
(g) The operator's cab shall be cooled with an air conditioning system capable of a minimum of 17,000 Btu/hr. The air conditioning system shall be R-134a compliant.
(h) The condensing unit shall be mounted on the rear of the cab and be equipped with maximum protection against damage from trees, tree limbs and brush.
(i) The condensing unit shall be equipped with a guard having a minimum thickness of 6 mm or about 1/4 inch.
(j) Airflow vent holes on shield shall be protected so that debris greater than 10 mm will not fall into them.
(k) The pressurization system shall deliver air to the operator's compartment that has been filtered through a spark-arresting screen, a high efficiency particulate element (HEPA) and through an activated carbon element.
(l) The filter system shall be placed where it is unlikely to be impinged by heat and flames.
(m) The particulate media shall have an efficiency rating of 93 DOP at 0.5 micron.
(n) The activated carbon element shall have an absorption rate equal to or greater than 25% and deodorizing properties greater than 90%.
(o) The media material shall be fiberglass or meet UL900 Class Specifications.
(p) Any externally mounted filters shall be protected from brush damage.

(q) The pressurizer fan shall be rated at 328 CFM minimum.
(r) The fresh air intake shall be routed to minimize intake of dust, embers, smoke and flames. And located or protected to avoid damage in forest environment.
(s) The operator's compartment shall have left side and right side access doors.
(t) The doors of the operator's compartment shall be lockable to prevent unauthorized entry and operation of the machine.
(u) Hold-open latches are not permitted on doors.
(v) The windows shall be capable of being secured in the open position to allow for cross flow ventilation.
(w) All hinges, latches wiring to have protective guarding to prevent damage from tree limbs and debris.
(x) Screening systems shall be installed on the outside of the front, side, rear, and door windows and meet the requirements of ISO 8084 and SAE J1084.
(y) The screens shall be painted a dark, non-glare color.
(z) Protective screens shall be hinged to permit access without tools.
(aa) Side screens are to be quick release latch accessible inside and outside the cab for an emergency egress.
(bb) The windows shall be tempered safety glass, tinted 30%.
(cc) Window glass shall be heat resistant to 550 degrees F.
(dd) The front window, door windows and rear window shall be equipped with a wiper and washer.
(ee) The heater/defroster shall have a minimum capacity of 18,000 Btu/hr.
(ff) The heating/cooling/pressurizing system shall conform to the requirements of SAE J1503/J1535D.
(gg) Extra filters (engine oil, fuel, hydraulic, and all cabin filters) will be provided (1 each) at time of delivery.
(hh) After treatment system shall be maintenance free for the life of the engine, and not require scheduled service.
(ii) After treatment system shall be double insulated to reduce surface temperatures that could result in a fire.
(jj) DEF System shall purge lines with disconnect switch in the "off" position.
(kk) Instrumentation shall include gauges for fuel level, engine oil pressure, engine coolant temperature and DEF level.
(ll) Monitor system shall provide engine speed, low hydraulic oil level, system voltage, transmission oil temperature, hydraulic oil temperature, and engine hours.
(mm) An on-board diagnostic system shall be included in the monitor system
(nn) A yaw or slope indicator system shall be included on the monitor or with an inclinometer easily visible.
(oo) At least one floorplate in the operator's compartment shall be provided to provide access to the transmission/pump compartment.
(pp) Floorplate shall be quick release mounted for instant access without the use of tools for fire suppression in the belly pan.
(qq) Floorplate shall be 7 inch x 7 inch minimum to easily accept a fire extinguisher or hose nozzle.
(rr) The padded rubber floor cover will be removable to allow access to the floorplate.
(ss) A cab perimeter guard shall be constructed of square tubing not less than 3 inches x 3 inch x 3/16 inch thick with a minimum of four connecting points to the cab's roof.

(tt) It shall provide protection to sides and top corners of the cab and the air-conditioning unit on rear of machine.
(uu) The total height of the dozer/transport including guards but excluding antenna of 113 inches.
(vv) The tractor shall be equipped with a warning horn, 117 db. minimum, per the latest issue of SAE J1105, type J.
(ww) The tractor shall be equipped with self-cleaning, anti-skid surfaces and hand grips as needed for safely mounting and dismounting the tractor and for all maintenance operations normally performed weekly, per the latest issue of SAE J185.
(xx) The tractor shall be equipped with a convex mirror, mounted inside the operator's compartment, with a minimum 26 square inch viewing area.
(yy) ONE (1) ten pound (10 lb.) shall be mounted inside the operator cab and be within reach of the seated operator or TWO (2) five pound (5 lb.) ABC rated fire extinguishers one to be mounted inside the operator cab within reach of the seated operator and one to mounted in rear toolbox.

8). **Hydraulic System**

(a) Hydraulic system should have a minimum of 2 valves each, four way, four position, detented in float position and both valves with spring return to neutral, providing the following functions:

1. C-Frame or blade: up, down, lock, float
2. Blade mounted winch operation
3. Rear fire plow: up, down, lock, float, or…
4. Rear mounted winch operation if required.

(b) Dozers shall have an additional valve capable of providing angle and tilt functions for the blade.
(c) Blade functions, fire plow, and winches shall work separately (4 valve system).
(d) A rear hydraulic circuit shall be provided for rear-mount fire plow or winch. The circuit shall connect to the plow via ½ inch breakaway coupler per latest issue of SAE J1036. Couplers shall be Parker Part # 8250-4 Body Assembly and Part # 8010-4 Nipple Assembly located according to the latest issue of SAE J716, as close as possible to the center of rear of tractor.
(e) Plow and winch shall be separate control levers capable of immediate hydraulic response. Toggle switches will not be accepted as hydraulic controls.
(f) Hydraulic reservoir shall be steel. No plastic tanks will be accepted.
(g) It shall be equipped for the slowest speed available from the manufacturer.
(h) The winch shall be supplied with preformed wire rope, XXIPS, 6 x 19 constructions with independent wire rope core.
(i) It shall be supplied with ¾" x 150 feet of wire rope.
(j) The wire rope assembly is to include a heavy duty slip hook, thimble and swaged eye. In addition it shall include one choker and slide. The most compact, lightweight winch available, meeting these specifications, is to be provided and mounted on the dozer.
(k) The tractor shall have a rear mounted camera for vision of the rear mounted winch cable area.
(l) Camera monitor shall be mounted for operator safety and convenience. The monitor can be set to automatically activate when rear winch is engaged or manually controlled to use any time.

9). **Blade Mounted Winch**

(a) Dozer blade shall be equipped with a 20,000 pound (bare drum line pull) hydraulically driven, mounted horizontally on the blade, DP retrieval winch, part number 20AJAAX5L6A-003 or equivalent, including 5/8 inch x 80 feet wire rope, 6x19 IWRC construction, XXPS, with short chain and hook.
(b) Each winch shall be tested to meet standard.
(c) Winch mount shall be integral with blade brush guard.
(d) Winch shall include four-roller fairlead.
(e) Winch shall include power in/out, brake and free spool functions.
(f) Winch and mount weight shall not exceed 500 pounds.
(g) Hydraulic system shall provide oil delivery to produce 15 fpm line speed.
(h) Hydraulic lines shall be integral to the C-frame and blade and shielded.
(i) Blade mounted winch hydraulic system shall be direct to hydraulic valve.
(j) Blade mounted winch shall be low profile.
(k)Blade mounted winch hydraulic hoses and fittings shall be heavy duty and protected from being damaged by tree limbs and debris.

10). **Fire Protection Equipment**

(a) Locks for cab doors and ignition, if so equipped, shall be keyed alike using standard ignition key.
(b) A minimum of two (2), keys shall be furnished per unit.
(c) Front pull hook shall be closed eye or pin type.
(d) Two (2) rear retrieval eyes shall be welded to the transverse case of the mainframe of the tractor.
(e) Two (2), "D" rings shall be attached to each roller frame for securing the bulldozer during transport. Location of the D rings will be determined before delivery D rings to be mounted by the manufacturer.
(f) The "D" rings and attachment shall meet or exceed all DOT requirements for securing a load equal in weight to the Bulldozer tractor bid.
(g) Belly pan shall be:
1. Heavy duty full-length with enclosed sides.
2. As many bolt-on compartment doors as possible for cleaning/flushing out debris. Doors shall be located at the lowest point of the compartments. Bolt heads to be guarded or Grade 8 bolts utilized to protect from possible damages due to rock shear. (NOTE: Protective unit shall be comprised of a complete belly pan with enclosed sides and reinforcement for additional support and protection. Skid plates mounted on arms are not acceptable. Belly pan may be omitted under transmission, if manufacturer warrants transmission case to act as belly pan.)

(h) Any wiring, essential to the continued operation of the tractor shall be protected from fires using protective sheathing Aeroquip AE 102 or equivalent. Non-flammable clamps or ties only.
(i) The engine enclosure shall be made of a minimum, 1/8 inch, perforated, sheet steel and side shields shall be equipped with quick-release mounts or doors for instant access to the engine compartment without the use of tools.
(j) Fuel lines shall be flexible stainless braided steel to be routed and clamped to prevent chafing or breakage from vibration
(k) Hydraulic and coolant hoses in the engine compartment or belly, within 12 inches of the bottom guards, shall be covered with fire resistant sheathing, Aeroquip AE 102 or equivalent.
(l) Hose armor guarding or Cordura shall be used on all exterior hoses.
(m) Hoses and hydraulic fittings routed to blade shall be guarded.

(n) The engine shall not de-rate.
(o) The dozer shall be equipped with storage compartments adequate to store the following items inside the machine: first aid kit, fire shelter, and hand held radio.
(p) Unit shall be equipped with external tool box(es) located on the rear of the cab, above the winch or plow.
(q) Lockable non perforated tool box (es) on rear of cab, shall be the width of the cab, have a sloped top, minimum of 12 inches deep, and not interfere with the operation of the winch or plow.
(r) Width and depth of the tool box(es) shall be large enough to allow hauling:

1. Drip torch
2. Hand held tools: hammer, sledge hammer, wrenches, pliers, cable cutter
3. Spare plow hydraulic hoses
4. Chain
5. Ax
6. Miscellaneous Supplies
7. Chain Saw

(s) Vandalism protection kit including locking covers/caps for all fill and dipstick points (less padlocks).
(t) Heavy duty hood and engine compartment side shields.
(u) Both engine side shields shall be hinged and/or quick release mounted.
(v) The hood and engine compartment side shields shall be perforated to the maximum extent offered by the manufacturer.
(w) Track, sprocket and roller guards shall be maximum gauge offered by the manufacturer.
(x) The tractor shall be equipped with point to point limb risers (sweeps) meeting the requirements of OSHA 1910.266. Limb risers shall be isolation mounted and be readily removable for tractor maintenance.
(y) A fuel tank-guard shall be provided. It shall be of maximum gauge offered by the manufacturer.
(z) A back up Smart alarm shall be provided.
(aa) A manual master electrical disconnect switch shall be provided.
(bb) One (1) hard and one (1) electronic copy of Operator's, Service Manual, Technical Repair Manual shall be furnished per unit.
(cc) The machine shall have an on-board diagnostics system that can be accessed on the machine or wireless.
(dd) Trouble codes indicating that there is a problem with the unit are shall be accessible to the operator by viewing the monitor.
(ee) Some machine parameter aggressiveness levels, etc., may also be adjusted via the monitor by the operator.
(ff) A fuel line shutoff valve shall be provided within reach of the seated operator.
(gg) Foot operated engine decelerator.
(hh) Remote test ports for transmission provided if not accessible.
(ii) Exterior hydraulic hoses shall be covered with Cordura sleeving and hydraulic fittings shall be guarded.
(jj) Where possible, all hoses shall be routed internally of the main frame.

11). **Machine Outfitting and Delivery**

(a) All tractor outfitting shall be performed at an authorized facility, approved both by the tractor manufacturer and the state of Tennessee.
(b) Solid model geometries of all protective structures shall be available in digital media upon request.
(c) Each tractor shall be serviced and prepared for immediate operation, prior to delivery. The pre-delivery inspection and service shall include the following: Check all fluid levels, check operation of all instruments and controls, make sure all adjustments are correct for operation, remove excess tags, stickers or shipping labels, and a full fuel tank.
(d) Each unit shall have a service center able to fully support product within 100 miles of unit's assigned location.
(e) Vendor shall, upon request, provide a test unit of the exact model bid and demonstrate that the unit meets or exceeds the minimum performance requirements prior to the bid award. Test unit does not have to be a fire equipped machine, but it shall be the same model that is bid.
(f) Exterior color to be painted "industrial safety yellow", except for the limb risers and brush screens. All brush screens, limb risers, and other areas that might cause glare are to be painted flat black. The interior of the cab is to be a non-glare color.
(g) Unit is to be delivered (!?) days from receipt of purchase order.
(h) An appropriate grease gun shall be included with each tractor.
(i) Warranty – Engine & powertrain – Minimum 7 year, 4000 hours, 100% parts & labor, Warranty period begins when unit is placed "in service" not the date of delivery not to exceed (6) months from delivery.

12). **Training**

Vendor shall provide an eight hour training sessions as needed at the location(s) specified by TDF that includes safety, operation, maintenance, diagnostic and troubleshooting procedures, and preventative maintenance schedules.

This training shall be within three (3) months after acceptance of each batch of units. Additional training will be provided on specific components as deemed necessary by mutual agreement between the Tennessee Division of Forestry and the successful vendor. This training will be identified at a later date and shall be furnished at no additional cost.

13). **Radio Installation**

(a) General wiring and installation specifications for radio and antenna:
(b) Specific location of items associated with radio, antenna and mount installations will be determined through discussions with Division of Forestry radio technician.
(c) System shall be compatible with 12 volt DC, 100 watt VHF Motorola XTL2500 two way radios.
(d) All power supply wiring and radio to antenna feed line (coax) shall be installed in accordance with good engineering practices and in such a manner to prevent kinking of or excessive bending, chaffing or other intentional damage. The intention is for the radio wiring and feed line to be installed in such a manner as to integrate with and resemble the original O.E.M. installation without damaging or impeding the original O.E.M. installation. No "splicing" into the original O.E.M. harness will be allowed.
(e) All power supply wiring and radio to antenna feed line (coax) shall be protected from fires using protective sheathing Aeroquip AE 102 or equivalent.

(f) All power supply wiring and radio to antenna feed line (coax) where it travels through bulkheads/firewalls or similar shall be protected from chaffing with the use of tractor/OEM grade grommets or similar protective measures.
(g) Any bolts protruding through the dash/firewall or similar shall have their ends covered with vibration resistive tractor/OEM grade silicone or protective caps to prevent chaffing of the wiring harness.

13.1 **Power Wiring Requirements**

(a) If the tractor is designed on a primary voltage system other than 12 volt DC, a power convertor converting system power voltage to 12 volt DC at 20 amps nominal is required. Such systems shall include documentation, schematic diagrams, and covered under warranty by vendor.
(b) Main Positive and Negative leads shall each be wired with a separate circuit; the Positive lead shall be protected by a self-resetting Fire Fighting Bulldozer/Tractor grade circuit breaker of 30 amp rating. A Motorola Mobile 10 foot, power cable Model HKN4191B or 20 foot, power cable Model HKN4192B shall be attached to the device side of the self-resetting breakers. This OEM cable contains a detachable 15 or 20 amp fuse holder. This fuse holder may be used if it is accessible for replacement without tractor disassembly. A different style 20 amp minimum fuse holder in an accessible location may be used. All connections shall be anticorrosive Fire Fighting Bulldozer/Tractor grade.
(c) All Power Supply main lead wiring shall be a minimum of 10 gauge AWG Fire Fighting Bulldozer/Tractor grade wiring from the power source to the source side of the resettable circuit breaker. Positive shall be red in color and negative shall be black in color.

13.2. **Antenna Requirements**

(a) Antenna shall be mounted in a protected area of the hood and where exhaust system heat is not a problem.
(b) Coax cable to radio shall be Tessco Part #331241 or equivalent. The termination at the radio will include at least 6 inches of extra cable inside of tractor panel for hookup and testing purposes.(Do not cut excess coax cable, tuck excess cable inside tractor panel)
(c) Customer shall provide NMO Antenna. NMO connector installed on outside of dozer shall be protected from water until supplied Antenna can be attached.

13.3. **Mounting Bracket**

(a) Specific location of radio installation will be determined through discussions with Division of Forestry radio technician.
(b) Radio is to be mounted using Motorola Model HLN6861D mounting bracket. Custom machined, painted and sealed material can be used if the stock Motorola Bracket will not provide an ease of radio operational use and visibility.
(c) Proper clearance on each side of radio bracket is required; minimum of 1 inch due on each size of Motorola thumb screws and quick radio replacement upon failure. Minimum of 7 inches rear clearance from the side mount screws to the rear wall surface is needed.

13.4. **Radio Speaker**

(a) Standard equipment radio speaker Motorola Part # HSN4032B shall be used for the two-way radio system.
(b) Specific location of speaker installation will be determined through discussions with Forestry radio technician.

13.5. **Mic Clip**

Vendor will provide a HLN 9073B Motorola Microphone clip for mic placement in an easy to reach location. Specific location of microphone clip installation will be determined through discussions with Forestry radio technician. Mounting the clip on a grounded metal surface is preferred but not required.

Dozer Categories A – C

Bulldozer Specification – A

(104 HP extended track, 1250H Fesco plow)
1. Engine – 104 hp, net, min; Diesel; 4 cylinders.
2. Drawbar/sprocket pull –8,400 lbs. at 3.0 mph or Maximum Drawbar pull 33,600 lbs.
3. Transmission - Dual path, hydrostatic drive with single lever control. Travel speed control shall be in grip.
4. Base Weight – 18,000 pounds, min. and maximum 23,500 pounds. (Fully outfitted weight 27,500 lbs. max.)
5. Ground Pressure - 6.5 psi base, max
6. Electrical system voltage – 24 or 12
7. Alternator capacity - 100 amps min.
8. Maximum Travel Speed – 6.0 mph forward
9. Track Gauge - 61" max - Overall Machine Height (tip of grouser to highest point) 113" Max Overall Machine Width 80" Max, no blade, Overall Machine Width 80" Max, no blade
10. Track roller frames and front idlers to be heavy-duty type, capable of fire suppression service.
11. Track Shoe Width - 18" nominal, centered on rail
12. Length of track on ground - 89" min
13. Ground clearance - 13", min, measured at rear center of tractor
14. Track Rollers - 7, min
15. Hydraulic Pump Capacity - 15 gpm, min
16. Hydraulic System Pressure - 2900 psi, min
17. Fuel capacity - 45 gallons, min.
18. Cooling System Capacity - 5 gallons, min
19. Dozer Blade – Width 100" max, 97" min; Height 42" max, 38" min
20. Cutting Edge & End Bits - Reversible or Replaceable
21. Blade Lift Above Ground – 28.7", min
22. Blade Tilt - 12" min
23. Blade Angle - 25 degrees, min
24. Blade Brush Guard – Full width 15-18" high
25. Plow Position - Rear Mounted
26. Blade winch – DP retrieval winch, part number 20AJAAX5L6A-003 or equivalent
27. Hydraulic Lift Plow – Fesco - RM1250H or equivalent with plow transport lock release system operated from inside the cab so operator can engage plow without leaving cab. No accumulators or hydraulic releases will be accepted.

Bulldozer Specification - B
(104 HP min, extended track, rear mounted winch)
1. Engine – 104 hp, net, min; Diesel; 4 cylinders.
2. Drawbar/sprocket pull – Minimum 8,400 lbs. at 3.0 mph or Maximum 33,600 lbs.
3. Transmission - Dual path, hydrostatic drive with single lever control. Travel speed control shall Be in grip.
4. Base Weight – 18,000 pounds, min. and maximum 23,500 pounds. (Fully outfitted weight 27,500 lbs. max.)
5. Ground Pressure - 6.5 psi base, max
6. Electrical system voltage – 24 or 12
7. Alternator capacity - 100 amps min.
8. Maximum Travel Speed – 6.0 mph forward,
9. Track Gauge - 61" max
10. Overall Machine Height (tip of grouser to highest point) 109" Max
11. Overall Machine Width 80" Max, no blade
12. Track roller frames and front idlers to be heavy-duty type, capable of continuous use per Application in scope.
13. Track Shoe Width - 18" nominal, centered on rail
14. Length of track on ground - 89" min
15. Ground clearance - 13", min, measured at rear center of tractor
16. Track Rollers - 7, min
17. Hydraulic Pump Capacity - 15 gpm, min
18. Hydraulic System Pressure - 2900 psi, min
19. Fuel capacity - 45 gallons, min.
20. Cooling System Capacity - 5 gallons, min
21. Dozer Blade – Width 100" max, 97" min; Height 42" max, 38" min
22. Cutting Edge & End Bits - Reversible or Replaceable
23. Blade Lift Above Ground – 28.7", min
24. Blade Tilt - 12" min
25. Blade Angle - 22 degrees, min
27. Blade Brush Guard – Full width 15-18" high
28. Blade winch – DP retrieval winch, part number 20AJAAX5L6A-003 or equivalent
29. Rear mounted hydrostatic winch 38,000-40,000 lbs. line pull-bare drum, 131 ft/min speed-bare drum.
30. Winch Control Positions-Power in, power out, free spool, brake-on, brake-off
31. Wire Rope - ¾" x 150 ft., 6 x 19 class, IWRC, XXIPS, heavy duty slip hook, thimble, swagedeye, one choker and slide.
32. Fairlead - Four-roller

Bulldozer Specification - C

(104 HP min, extended track, low ground pressure, 1250H Fesco plow)

1. 104 hp, net, min; Diesel; 4 cylinders
2. Drawbar/sprocket pull – 8,400 lbs. at 3.0 mph or Maximum Drawbar pull 33,600 lbs.
3. Transmission - Dual path, hydrostatic drive with single lever control. Travel speed control shall be in grip.
4. Base Weight – 18,600 pounds, min. and maximum 23,500 pounds (Fully outfitted weight 27,500lbs. max.)
5. Ground Pressure- 5.3 psi base, max
6. Electrical system voltage – 12 or 24
7. Alternator capacity - 100 amps min.
8. Maximum Travel Speed – 6.0 mph
9. Track Gauge - 69” max
10. Overall Machine Height (tip of grouser to highest point) 113” Max
11. Overall Machine Width 93” Max, no blade
12. Track roller frames and front idlers to be heavy-duty type, capable of continuous use per application in scope.
13. Track Shoe Width - 24” nominal, centered on rail
14. Length of track on ground - 89” min
15. Ground clearance - 13”, min, measured at rear center of tractor
16. Track Rollers – 7 min
17. Hydraulic Pump Capacity - 15 gpm, min
18. Hydraulic System Pressure - 2900 psi, min
19. Fuel capacity - 45 gallons, min
20. Cooling System Capacity - 5 gallons, min
21. Dozer Blade – Width 100” max, 97” min; Height 42” max, 38” min
22. Cutting Edge & End Bits - Reversible or Replaceable
23. Blade Tilt - 12” min
24. Blade Angle - 22 degrees, min
25. Blade Brush Guard – Full width 15-18” high
26. Blade winch – DP retrieval winch, part number 20AJAAX5L6A-003 or equivalent
27. Hydraulic Lift Plow – Fesco RM1250H or equivalent with plow transport lock release system operated from inside the cab so operator can engage plow without leaving cab. No accumulators or hydraulic releases will be accepted. Rear mounted.